

December 28, 1983

CD 83-17 (HDE)

Dear Heavy-Duty Engine Manufacturer:

Instructions for the preparation and submission of applications for certificates of conformity for 1985 model year heavy-duty engines are enclosed. The use of these instructions is optional. Any application which includes all of the necessary information will be accepted.

The enclosed instructions are similar to those that were issued for the 1984 model year except for the following changes which were necessitated by the November 16, 1983 revisions to 40 CFR, Part 86, Subpart A:

1. Subsection 10.08 has been expanded to include the designation of each diesel engine family according to its primary intended service class and an explanation of the basis for the classification.
2. The Test Log and Certification Information Sheet forms have been revised to include notations regarding the transient procedure that was used for gasoline-fueled engine testing and the waiver of CO emissions measurements and/or Hot Start results in connection with diesel engine testing.
3. The Test Log and Certification Information Sheet forms have also been revised to delete the 1983 model year combined HC and NOx limits, add separate NOx limits, and add idle CO limits for gasoline-fueled engines which use catalytic emission control systems.

The application structure outlined in the enclosed instructions is identical to that which was suggested for prior year applications. In instances where a previously requested item of information has been eliminated, the section involved has been reserved so that the numbering system would not be disturbed.

The information which is specified in the enclosed instructions does not include all of the data or records which are specified in 40 CFR, Part 86, subparts A, I, N, and P. The information which is not requested must be maintained in the applicant's

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files to be provided to EPA upon the receipt of a specific request. The information which is submitted in the application must be kept up-to-date during the associated production period by the submission of the appropriate revised pages.

Any questions, comments, or suggestions regarding the instructions should be directed to Mr. J. Bozek (313 668-4244) or Mr. T. Snyder (313 668-4442).

Sincerely yours,

Robert E. Maxwell, Director  
Certification DiViSion  
Office of Mobile Sources

Enclosures

INSTRUCTIONS  
FOR THE  
PREPARATION AND SUBMISSION  
OF  
APPLICATIONS FOR CERTIFICATES OF CONFORMITY  
FOR  
1985 MODEL YEAR HEAVY-DUTY ENGINES

ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF MOBILE SOURCES  
DIVISION OF CERTIFICATION  
2565 PLYMOUTH ROAD  
ANN ARBOR, MICHIGAN 48105  
(313) 668-4200

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## Chapter 1

### Introduction

The purpose of these instructions is to provide guidance regarding the preparation, submission, and revision of applications for certificates of conformity to the Federal regulations which govern exhaust emissions from 1985 model year heavy-duty engines. Detailed specifications regarding the information which must be provided and suggestions concerning the organization and submission of this information are presented. The preparation of applications by manufacturers who request and receive approval for the use of the small-volume manufacturers certification procedure is specifically addressed in Chapter 4.

An application which is prepared in accordance with these instructions is EPA's principal source of information regarding the product line which is to be certified. This information provides the primary basis for the determination of compliance with emission control regulations. Therefore, the application must be complete and accurate when it is submitted. After it is submitted, it needs to be kept current by the submission of the necessary updating material.

The information specified in these instructions does not include all of the data and records which are specified in 40 CFR, Part 86. The material which is not specified in the instructions must be retained in the applicants' files to be provided to EPA upon the receipt of a specific request.

## Chapter 2

### General Instructions

This chapter provides general instructions regarding the preparation, submission, and revision of an application for certificates of conformity for 1985 model year heavy-duty engines.

#### 2.1 Letter of Intent

The application for a certificate of conformity is not submitted until all phases of the certification program, including all testing, have been completed. This procedure eliminates the delays that would be incurred if interaction with EPA was necessary at the various intermediate stages of the applicant's certification program but it impairs EPA's ability to set up schedules and formulate plans which will help facilitate a timely response to the applicant's requests for assistance and approval. Therefore, the applicant

is encouraged to submit a letter of intent to EPA before the application is submitted. The basic information relating to each engine family to be certified, such as the identifying family name, the anticipated date when the request for a certificate will be submitted, and the Job 1 date, should be submitted as soon as possible. The inclusion of any other general information,

such as the anticipated carryover of test data from previously certified test engines, is recommended. The submittal of such a letter of intent should not be delayed until all information is completely finalized. Best estimates, when finalized data are not available, can be used. However, if significant changes in the anticipated certification program, such as the deletion or addition of an engine family, are made after the submission of a letter of intent, a letter which updates the previously submitted information should be forwarded to EPA.

#### 2.2 Terminology

Certain terms contained in the format have unique connotations to assist applicants in meeting EPA's requirements for information. These unique connotations are defined in 40 CFR Part 86.

### 2.3 Structure of the Application

A specific application format is recommended in these instructions. However, any logical comprehensive presentation of the information specified in these instructions is acceptable.

The recommended structure of the 1985 model year application for certification is divided into the following sections:

1. Communications
2. Statement of Confidentiality
3. [Reserved]
4. [Reserved]
5. [Reserved]
6. Maintenance and Warranty
7. Labeling
8. General Technical Description
9. [Reserved]
10. Engine Family Descriptions
11. [Reserved]
12. Test Engine Information
13. [Reserved]
14. [Reserved]
15. [Reserved]
16. Request for Certificate

Chapter 3 of these instructions specifies the precise contents of each of these sections.

The division of the application into sections reflects the fact that the elements of information within the application vary widely in their relevance and applicability to the applicant's product line or certification program as a whole. The data required by Section 10 (Engine Family Descriptions), for example applies to a single engine family; a description of a carburetor in Section 8 (General Technical Description) would pertain to all engines and engine family/exhaust emission control system combinations that would be equipped with that carburetor during a particular model year; the discussion of Maintenance and Warranty (Section 6) would apply to the applicant's entire certification program and product line for one model year. The suggested format groups together in Sections 1 through 8 the "general" information that applies broadly to the entire product line or certification effort; Sections 9 through 15 provide information which are specific to particular test engines or engine families; Section 16 is a summary of the data required to substantiate that the new engines comply with Federal emission standards (Ref: 40 CFR 86.085-10 and 11).



## 2.4 Size and Form of the Application

All applications should be presented on 8-1/2 inch by 11 inch paper, or a reasonable equivalent, and be bound in a looseleaf cover of the same approximate size. Divider pages should be used to separate the recommended application sections from one another.

## 2.5 Referencing

Referencing permits a reduction in the size of the application by minimizing duplication and redundancy. In many of the applications that were submitted in previous model years, identical information which was applicable to several engine families was reproduced in several different places. "Referencing" makes use of a single description to cover all instances within the application where that information may be necessary to eliminate such needless repetition.

Applicants are encouraged to reduce duplication by referring to the location of a unit of information's first submission whenever access to that information is required, rather than needlessly reproducing identical data. In essence, the concept of referencing reduces paperwork by encouraging the applicant to submit a unit of information only once for each model year. Referencing across model Years is not allowed with the exception that Applicants may reference Test Engine Information, Section 12, across model years. The applicant must have submitted Section 12 in a separate binder in order to reference across model years.

Applicants should be wary, however, of applying the referencing concept too freely and producing an application whose every page is a bewildering network of allusions to other pages of the application. Such overuse of referencing would generate a document that, although free of repetition, could not be reviewed without large amounts of inefficient crosschecking and page-turning. Applicants should consequently exercise good judgment to prevent taking the referencing concept to unproductive extremes.

## 2.6 Page Numbering

Each page number should include the respective section number, e.g., 02-2 (section 02.00.00.00 -page 2), 08.01.01-15 (section 08.01.01.00 -page 15), 05.01-9 (section 05.01.00.00 -page 9). The detail of the indexing system which is used in page numbering should be based upon the amount of information contained in a given section. In section 02.00.00.00, there is not a large enough volume of information to support a finer breakdown; however, in section 08.01.00.00 there may be many pages of carburetor description as well as fuel injection description so it may be appropriate to use three levels of indexing

in the page number (even four may be appropriate if there are a number of carburetors to describe). It is up to the applicant to decide what type of

detail is appropriate for his application. Some provision, such as the use of decimal numbers, should be made for adding a new page with new or supplemental data without disturbing the numbering of the other pages in a particular section, e.g., 02-2.1.

For sections that are specific to a particular engine family (e.g., 10.00.00.00, 16.00.00.00), the page numbering system should include the name of the appropriate engine family to avoid confusion in handling many pages of similar format, e.g., 10-CHC0466EPA3 (for engine family CHC0466EPA3). For purposes of page numbering, the standardized engine family name (see Appendix pages 1-10) may be abbreviated by deleting the model year and manufacturer characters, which would be common to all of a manufacturer's engine families for a given model year, and the check-sum digit, e.g., 10-466EPA-2. Further abbreviation is permissible as long as the resulting designation is sufficient to identify the engine family uniquely within the application. If displacement and the "uniqueness digits" constitute a distinctive abbreviation for the family name, for instance, then 10-466A would be an adequate page number. Applicants who wish to use abbreviated family names shorter than seven characters should clearly indicate on the divider page that precedes the engine family information the abbreviation to be used; all such abbreviations should be summarized in a table at the beginning of Section 10.00.00.00).

## 2.7 Indexing

The format recommended in these instructions assigns a unique eight-digit code to every element or unit of certification data contained within the application. Each code consists of four two-digit pairs, such as 10.03.01.03, with each successive pair indicating a more precise and specific level of description. Hence, in this example, the 10 refers to engine family descriptions; the 03 refers to the fuel system (one of the individual engine parameters); the 01 refers to carburetor; and the 03 refers to calibration.

The table on pages 2-5 and 2-6 sets forth all codes which can be used within an application for certification. Some of these codes include two-digit pairs whose value is double zero (00, as in Carburetors--08.01.01.00). The presence of the double zero pair indicates that one available level of the indexing scheme has not been assigned by EPA. Designations at this level can and should be assigned by applicants, however, if distinctions at this level of precision need to be drawn. If an applicant needs to provide general technical descriptions of two kinds of carburetors, for example, the pertinent sections of the application could be labeled 08.01.01.01 and 08.01.01.02.

All submissions of certification data, should be structured according to the indexing order outlined below. Page numbers should also reflect this order, as is specified in Subpart 6 of this Chapter on page numbering. It is not strictly necessary to tag information within the pages of the application with

their corresponding codes, if it is always clear what kind or element of data is being presented or described.

Section Number	Sequence Number	Title
01.00.00.00		COMMUNICATIONS
.01.00.00		Mailing Information
.01.00		Technical Representatives
.02.00		Advisory Circulars and Other Technical Information
.03.00		Certificate of Conformity
02.00.00.00		STATEMENT OF CONFIDENTIALITY
03.00.00.00		RESERVED
04.00.00.00		RESERVED
05.00.00.00		RESERVED
06.00.00.00		MAINTENANCE AND WARRANTY
.01.00.00		Owner's Manuals
.02.00.00		Shop Manuals
.03.00.00		Technical Service Bulletins
.04.00.00		Emission System Warranty Statement
07.00.00.00		LABELING
08.00.00.00		GENERAL TECHNICAL DESCRIPTION
.01.00.00		Fuel Systems
.01.00		Carburetor
.02.00		Fuel Injection
.02.00.00		Ignition System
.03.00.00		Superchargers or Turbochargers
08.04.00.00		Emission Control Systems
.01.00		Crankcase
.02.00		Engine Modification
.03.00		Air Injection
.04.00		Exhaust Gas Recirculation
.05.00		Catalyst
.06.00		Smoke-Puff-Limiter
.07.00		One Bank Value
.08.00		Other
.05.00.00		Auxiliary Emission Control Devices
.06.00.00		Emission Control Warning Devices

09.00.00.00	RESERVED
10.00.00.00	ENGINE FAMILY DESCRIPTIONS (See Chapter 3 on preparing the application for the contents of this section)
11.00.00.00	RESERVED
12.00.00.00	TEST ENGINE INFORMATION
.01.00.00	Zero Hour Validation Data
.02.00.00	Emission Test Results
.03.00.00	Maintenance Information
.04.00.00	Engineering Reports
13.00.00.00	RESERVED
14.00.00.00	RESERVED
15.00.00.00	RESERVED
16.00.00.00	REQUEST FOR CERTIFICATE
.01.00.00	Statement of Compliance
.02.00.00	Deterioration Factor Summary
.03.00.00	Certification Information
.04.00.00	Certificate Information
.05.00.00	Production Engine Parameters
.01.00	Parts List
.02.00	Production Tolerances
.03.00	Quality Control Information

## 2.8 Standardized Engine Family Names

Applicants are strongly encouraged to use the standardized engine family naming system which is illustrated on Appendix pages 1-9.

## 2.9 Submitting the Application

Submission of the application is made after testing is completed and the application is in final form. One copy should be forwarded with a letter of transmittal to:

Director Certification Division  
Office of Mobile Sources  
U.S. Environmental Protection Agency  
2565 Plymouth Road  
Ann Arbor, Michigan 48105

A duplicate copy of the application should be forwarded to:

Director  
Manufacturers Operations Division (EN-340)  
U.S. Environmental Protection Agency  
401 M. Street, S. W.  
Washington, D. C. 20460

## 2.10 Revising the Application

After the application has been submitted, revisions may become necessary. The material which needs to be submitted depends upon whether or not a revision involves a product line change that may have an effect on emissions.

If a revision merely corrects an error or omission and does not involve a product line change which may have an affect on emissions, only a brief description or explanation of the revision and the revised application pages are submitted.

If a revision involves a product line change which may have an affect on emissions, a Certificate Change Request must be submitted along with a description of the revision and the revised application pages.

Many applicants in the past have followed a practice of identifying successive running changes with a number which includes the family designation and model year of the vehicle being affected. (For example, the number of the first running change in the 1985 model year for the ABC family might be 85-ABC-01). This practice has proved to be quite useful and is highly recommended.

Each page of the application should include a revision block which provides space for the date of issue as well as the effective date of each revision.

Revision No.

Revision Date:

## Chapter 3

### Preparing the Application

This chapter presents recommendations for preparing the sections of the application for certification in a manner that will ensure that the needs of EPA will be met. Careful adherence to these recommendations and the submission of all required data will greatly expedite the review process.

#### 3.1 Communications (Section 01.00.00.00)

This section of the application should contain information concerning:

##### (a) Routine Communications

The names, addresses, and telephone numbers of all technical representatives who are authorized to communicate with EPA should be provided.

##### (b) Receipt of Advisory Circulars and Other Technical Information

The name and address of the representative who is to receive the information should be provided. If the information is normally received through some organization (e.g., Engine Manufacturers Association), the fact should be noted so that unnecessary duplicate distribution can be avoided. If the information is to be picked up by couriers rather than mailed, this fact should be noted.

##### (c) Receipt of Certificates of Conformity

The name and address of the representative who is to receive the certificate should be provided.

At the beginning of the 1985 model year certification program EPA will assume that the Communications information provided in the applicant's 1984 model year application for certification is still applicable. To assure EPA's continued ability to communicate without inconvenience or delay, the applicant should keep EPA informed of any substantive change that may occur to the Communications information prior to the submission of the 1985 application for certification. If the applicant has not applied for certification prior to 1985, the communication information should be submitted as soon as possible, preferably well in advance of the submission of the application.

#### 3.2 Statement of Business Confidentiality (Section 02.00.00.00)

Section 208(b) of the Clean Air Act requires (1) the Administrator to disclose



to the public all non-trade secret information and keep trade secret

information confidential and (2) the person who has submitted the information claimed to be confidential to make a satisfactory showing that the information in question would divulge trade secrets, if disclosed. If an applicant fails to make a claim the information in the application may be made available to the public without further notice to the applicant.

Confidentiality claims and substantiating information are to be included with the data for which confidential status is requested at the time of submission to EPA. For information for which confidential treatment is desired, the following questions need to be addressed:

1. Which information in the application for certification is considered to be entitled to confidential treatment until model introduction?
2. Which information in the application for certification is considered to be entitled to continuing confidential treatment after model introduction?
3. To what extent has the information been disclosed to others, and what precautions were taken with respect to these disclosures?
4. Is the information available to the public through legitimate means?
5. Can the information be derived from a detailed engineering inspection of the motor vehicle model in question or from information already public once the model is offered for public sale?
6. Would disclosure of the information be likely to result in substantial harm to the applicants competitive position? If so, a detailed discussion regarding what the harmful effects would be, why the effects would be substantial, and the nature of the casual relationship between disclosure and the harmful effects must be presented.

Complete answers to these questions must be supplied for all information which is claimed to be confidential. The EPA General Counsel will make a final determination on the claim partly on the supporting data which are provided.

Information which is submitted in substantiation of a confidentiality claim may be claimed to be confidential in its own right. If the information pertains to the confidentiality claim, is not otherwise possessed by EPA, and is marked, when received by EPA, as "trade secret," "proprietary," or "company confidential," it will not be disclosed by EPA without the applicant's consent unless disclosure is ordered by a Federal court. If no claim accompanies this substantiation information when it is received by EPA, it may be made available to the public without further notice to the applicant.

To facilitate reproduction for release purposes, trade secrets should not be

included on the same page as information which is available for public release.

Also pages containing trade secret information should be clearly identified as "TRADE SECRET," "PROPRIETARY," or "CONFIDENTIAL."

3.3 Reserved (Section 03.00.00.00)

3.4 Reserved (Section 04.00.00.00)

3.5 Reserved (Section 05.00.00.00)

3.6 Maintenance and Warranty (Section 06.00.00.00)

At the time of issuance, all explanations regarding the use, repair, adjustment, maintenance, or testing of a engine relevant to the control of crankcase, or exhaust emissions issued by the manufacturer for use by other manufacturers, assembly plants, distributors, dealers, and ultimate purchasers. This requirement can be met by forwarding to EPA shop maintenance manuals, technical service bulletins, and vehicle owner's manuals. [Ref: 40 CFR 86.078-7(b)]

In addition to this information, the emission system warranty which will be provided to the ultimate purchaser is to be submitted to EPA.

Two copies of each of these items must be submitted, one to the Certification Division in Ann Arbor and one to the Manufacturers Operations Division in Washington, D.C.

3.7 Label Format (Section 07.00.00.00)

A copy of each label (either the actual label, a photograph, or a drawing) to be used to comply with 40 CFR 86.085-35 must be submitted. A photograph or a written description of the location of the label on the vehicle for each model certified must also be submitted.

3.8 General Technical Description (Section 08.00.00.00)

This section should be a reference book for Section 10.00.00.00. Whenever an explanation greater than a few words or a line is required in this section, a narrative explanation should be contained in Section 08.00.00.00. Similarly, whenever the configuration of a component needs to be shown, the drawing or schematic can be presented in Section 08.00.00.00.

Information, such as a emission control system features (Sec. 10.06.02.00),

which does not differ within or among engine families, will appropriately be listed in Section 08.04.00.00 and then referenced for each family to eliminate duplication.

3.9 Reserved (Section 09.00.00.00)

### 3.10 Engine Family Descriptions (Section 10.00.00.00)

The information submitted determines how the applicant's product line is subdivided into separate engine families.

When an application includes a number of engine families which share common characteristics, referencing should be used to avoid the submission of redundant information. The submission of much of this information may be eliminated by referencing a particular engine family. For example, if a manufacturer wishes to certify families A, B, and C, each of which differ by one or more parameters, the applicant can submit all the required information on engine family A and then submit a single page for engine families B and C with a statement stating that these families are identical to engine family A except for the listed differences.

This concept can be enlarged where certain sections of an engine family may be different but would benefit from the use of referencing. Discretion will have to be used, however, to insure that this procedure is used in cases where there are few enough differences to make it an effective tool.

Section Number	Title
10.01.00.00	Common family parameters
.01.00	Block configuration
.01	Number of cylinders
.02	Cylinder head configuration (specify OHV, OHV/OHC, etc.)
.03	Type of cooling (air, water)
.04	Cylinder arrangement (Inline, 90 Vee, etc.)
.02.00	Combustion cycle (four-stroke cycle, two-stroke cycle, etc.)
.03.00	Method of aspiration (natural, super- charged, etc.)
.02.00.00	Individual engine parameters (physical)
.01.00	Displacement
.02.00	Bore and stroke
.03.00	Advertised or rated HP @ RPM1 (include fuel rate if diesel in lbm/hr and mm3/stroke)
.04.00	Advertised or rated torque (include fuel rate if diesel in lbm/hr and mm3/stroke)
.05.00	Governed speed RPM (with engine loaded)
.03.00.00	Individual engine parameters (Fuel

system)

.01.00 Carburetor (gas only)

1Indicate whether net or gross, and specify method of measurement, e.g., 128  
BHP @ 4,000 RPM, SAE net.

- 10.03.05.01 Number of Carburetors
  - .02 Number of venturis per carburetor
  - .03 Calibration and range of adjustment
  - .04 Description
- .02.00 Fuel Injection
  - .01 Basic Type (e.g., mechanical, electronic, timed, continuous)
  - .02 Point of injection (e.g., manifold, throttle body, cylinder, precombustion chamber)
  - .03 Calibration and range of adjustment
  - .04 Description
- .04.00.00 Individual engine parameters (Ignition system)
  - .01.00 Basic ignition timing and range of adjustment
  - .02.00 Advance or retard calibration
  - .03.00 Description
- .05.00.00 Individual engine parameters (Supercharger or turbocharger)
  - .01.00 Type (centrifugal, roots, etc.)
  - .03.00 Calibration (if applicable)
- .06.00.00 Individual engine parameters (emission control system)
  - .01.00 Crankcase emission control system? (yes or no)
    - .01 Calibration
    - .02 Description
  - .02.00 Exhaust emission control system
    - .01 List all emission control system on engine
    - .02 Description of each emission control system
    - .03 Calibration of each emission control system
  - .03.00 Auxiliary emission control device (AECD)
    - .01 List all AECD used on engine
    - .02 Describes in detail each AECD
    - .03 Calibration of each AECD
  - .04.00 Evaporative emission control system used? (yes or no)
  - .05.00 Emission control related warning devices description
- .07.00.00 Transmission usage (manual, automatic, both) (gas only)
- .08.00.00 Useful life information (diesel only)

01.00      Primary intended service class (light,  
                 medium, or heavy)

     .01      Explanation of service class selection



### 3.11 Reserved (Section 11.00.00.00)

### 3.12 Test Engine Information (Section 12.00.00.00)

The test engine information section should be submitted in a separate loose-leaf binder. Divider pages should be used to separate the test engines. This test engine information will remain in EPA files so that applicants may reference this information across model years when carryover of test engine is desired. Applicants may add test engines to this section at anytime during the certification model year or during any later certification model year.

#### 3.12.1 Zero-Hour Validation Data

Before service accumulation on a test engine is initiated, the suitability of the engine for certification usage must be determine (Ref: Guidelines for Heavy-Duty Certification Engine Validation [Acquisition of Zero Hour Data]) and documented. The required documentation involves the engine; engine emissions-related components, such as carburetors and distributors when a gasoline-fueled engine is involved, and fuel injection equipment and turbochargers when diesel engines are involved; all emission control components such as PCV values, EGR values, air pumps, catalytic devices, and smoke puff limiters; and auxiliary emission control devices such as timers, delay values and attenuators. The data which must be recorded include part numbers, serial numbers or other identifying markings, and where applicable, flow curves or the results of other types of performance checks. Engine data sheets similar to the ones shown on pages 10 and 11 in the Appendix are useful for reporting the data obtained during the zero-hour validation of a test engine.

#### 3.12.2 Emission Test Results

The data which are obtained from each emission test that is performed on a emission-data engine must be recorded and submitted. The results can be reported on forms similar to those shown on pages 12 and 13 in the Appendix.

#### 3.12.3 Maintenance Information

All maintenance, scheduled and unscheduled, performed on a certification engine must be recorded. A form similar to that shown on page 14 in the Appendix can be used to report the maintenance.

#### 3.12.4 Engineering Reports

When unscheduled maintenance is performed on a certification engine an engineering report must be submitted. [Ref: 40 CFR 86.084-25(b)]

3.13 Reserved (Section 13.00.00.00)

### 3.14 Reserved (Section 14.00.00.00)

### 3.15 Reserved (Section 15.00.00.00)

### 3.16 Request for Certificate (Section 16.00.00.00)

The applicant must provide the statements specified in 40 CFR 86.085-23(d) regarding: (1) conformance with the general standards in 40 CFR 86.084-5 (b)(1), and (3) the availability of the information which demonstrates such conformance (see Advisory Circular No. 76). Also, the manufacturer must submit the statements specified in 40 CFR 86.085-23(e)(1) regarding the configuration and testing of the certification engines.

The following information must be submitted for each engine family:

#### 3.16.1 Deterioration Factor Summary

The applicant needs to submit the deterioration factors, and the data used in their calculation, for each engine-control system combination.

#### 3.16.2 Certification Information

The information which is required on pages 15 and 16 of the Appendix must be submitted. The exact form which is used on these pages must be used to facilitate the inclusion of the information into EPA computer data base.

#### 3.16.3 Certificate Information

The following information concerning the certificates of conformity needs to be provided:

- a. The person to whom the certificates should be mailed.
- b. The exact engine family designation to appear on the certificate.

#### 3.16.4 Production Part Numbers

A list of production part numbers needs to be included. A sample form for the presentation of part numbers is shown on page 17 in the Appendix.

#### 3.16.5 Production Engine Parameters

Production calibration data (showing tolerance limits) need to be included for each calibration of carburetor (or fuel injection systems), distributor,

automatic choke, AECD, EGR, turbocharger etc., which is available within the product line. Each set of data and calibration should be identified by:

- a. Engine family
- b. Engine displacement
- c. Engine code
- d. Fuel system

Each calibration and set of production tolerance limits shall also indicate (1) any differences from tolerance limits previously included in the application and (2) any special points at which all production pieces are checked and/or adjusted. For example, all carburetors are flow checked and air/fuel ratio adjusted at 2 and 6 pounds per minute air flow and checked at 4 and 30 pounds per minute air flow. Applicants should also indicate the percentage of production pieces checked and/or adjusted.

Describe sampling technique, i.e., how "production" tolerances are determined and how tolerance bands are used. For example, a 100 percent check, with rejection of all pieces outside of bands, a 2 percent audit of production, or a batch sampling technique.

For any production curve or calibration referenced in this section that is identical in all respects to an engineering curve or calibration previously included in this application, reference to the curve number and latest revision date in this section can be made in lieu of resubmitting the curve or calibration.

Alternatively, the applicant may provide an unqualified statement such as the following, defining the tolerances expected to apply to production vehicles:

This application for certification identifies and describes those vehicles to be covered by the certificate(s) of conformity issued by EPA, and this application for certification covers only those new motor vehicles to be produced by (company name) which conform, in all material respects, to the design specifications (including tolerances) which are contained herein.

## Chapter 4

### Requirements for Small-Volume Applicants

#### 4.1 Introduction

Applicants who obtain the Administrator approval (40 CFR 86.082-1(e) to use the small-volume manufacturer certification procedures should submit only the information requested in Subpart 4.2 below. Small-volume applicants are required to prepare and maintain in their files the information listed in the first three chapters of these instructions and any information specified in 40 CFR, Part 86.

#### 4.2 Submission Requirement

Small-volume applicants should submit an application for certification containing the following items [Reference 40 CFR 86.082-14(c)(11)(ii)]:

1. The names, addresses, and telephone numbers of the person the applicant authorizes to communicate with EPA and the person to whom the certificate should be mailed.
2. The corporate name and engine family name(s) that should appear on the certificate.
3. A brief description of the engines covered by certificate (the applicant's sales data book or advertising, including specification, may satisfy this requirement for most manufacturers). The description shall include, as a minimum, the following items as applicable.
  - A. Engine families and configurations.
  - B. Engine models to be listed on the certificate of conformity.
  - C. Projected sales.
  - D. Engine combustion cycle.
  - E. Engine cooling mechanism.
  - F. Number of engine cylinders.
  - G. Engine displacement.
  - H. Fuel system type.
  - I. Number of catalytic converters, volume, and composition.

J. Method of air aspiration.

K. Thermal reactor characteristics (if applicable).

L. Suppliers' and/or manufacturer's name and model number of any emissions related items of the above items if purchased from a supplier who uses the items in its own certified engine(s).

M. A list of emission component parts numbers.

N. Drawings calibration curves, and descriptions of emission related components and schematics of hoses and other devices connecting these components.

4. The results of all emissions tests the applicant performs.

5. The following statements:

A. The following statement signed by the authorized representative of the applicant: "The engines described herein have been tested in accordance with the [list of applicable subparts; A, I, N, or P] of Part 86, Title 40, United States Code of Federal Regulations, and on the basis of those tests are in conformance with that subpart. All of the data and records required by the subpart are on file and are available for inspection by the EPA Administrator. We project the total U.S. sales of engines subject to this subpart to be fewer than 10,000 units."

B. A statement that the engines described in the applicant's application for certification are not equipped with auxiliary emission control devices which can be classified as a defeat device as defined in section 86.085-2 of this subpart.

C. A statement of compliance with section 206(a)(3) of the Clean Air Act.

This information should be submitted with a letter of transmittal to:

Director  
Certification Division  
Office Mobile Sources  
U.S. Environmental Protection Agency  
2565 Plymouth Road  
Ann Arbor, Michigan 48105

A duplicate copy should also be submitted to:

Director  
Manufacturers Operation Division (EN-340)  
U.S. Environmental Protection Agency



401 M. Street, S.W.  
Washington, D.C. 20460

## APPENDIX

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EPA STANDARDIZED ENGINE FAMILY NAMES  
FOR HEAVY-DUTY ENGINES

## BACKGROUND

EPA-OMS has proposed to the manufacturers of LDV's that they adopt a standard format for their engine families. The main impetus behind the standard format is to reduce the number of transcription errors that occur when the engine families are entered into the data base. The standard format is designed to avoid the use of letters that are confused with numbers and it has a check digit to further assure accurate data entry. For those who are unfamiliar with a check-digit there is a discussion at the end of this report. The proposed ef codes also have fixed length and contain the same general information.

Heavy-duty (HDE) certification could benefit from this type of standard ef code; therefore, the format has been revised to be suitable for both LDV's and HDE's.

## FORM FOR HDE

The proposed ef code for HDE's are formatted as follows:

First character	Model year (see Table 1)
Characters 2 and 3	Letter code describing manufacturer (see Table 2)
Characters 4, 5, 6, and 7	Displacement in cc's (e.g., 350) or liters (e.g., 5.7). If more than one then largest displacement.
Character 8	Letter code describing type of engine (see Table 3)
Character 9	Letter code describing type of control system (see Table 4)
Character 10	Letter code to make first 10 digits unique. This character makes it possible to have up to 20 families for each combination of displacement, type of engine, and

control system.

Character 11

Check sum digit

Example--A 1980 International Harvester engine family DT-466B would be designated as:

AHC0466EPA5

A = MY 1980

HC = International Harvester

0466 = 466 cubic inches

E = Turbo-charged diesel

P = Smoke puff limiter

A = Uniqueness digit

5 = Check sum digit (Method of determining CSD is at back of paper)

TABLE 1. PROPOSED SUBCODES FOR MODEL YEAR

YEAR	CODE	
1980	A	
1981	B	
1982	C	
1983	D	
1984	E	
1985	F	
1986	G	
1987	H	
1988	J	
1989	K	
1990	L	
1991	M	
1992	N	
1993	P	
1994	R	
1995	S	
1996	T	
1997	V	
1998	W	
1999	X	
2000	Y	
2001		1
2002	2	
2003	3	
2004	4	
2005	5	
2006	6	
2007	7	
2008	8	
2009	9	
2010	A	
2011	B	
2012	C	

TABLE 2. PROPOSED SUBCODES FOR MANUFACTURERS OF HDE'S

Code	Manufacturer
AL	AVCO Lycoming Industrial
BB	Bluebird Body Co.
CT	Caterpillar Tractor Co.
CC	Chrysler Corporation
CE	Cummins Engines Company, Inc.
DB	Daimler-Benz Aktiengesellschaft
FM	Ford Motor Company
GM	General Motors Corporation
ND	Hino Motors, Ltd.
HC	International Harvester Company
SZ	Isuzu Motors Limited
VE	IVECO Trucks of North America
DZ	Klocker-Humboldt-Deutz AG
MT	Mack Truck, Inc.
MA	M.A.N.
MM	Mitsubishi Motor Corporation
MW	MWM Motores Diesel Ltd.
NM	Nissan Motor Co., Ltd.
NA	Onan Corporation
PE	Perkins Engines, Inc.
RE	Renault
RC	Revcon Incorporated
SS	Saab-Scania
TB	Transcor
VT	AB Volvo, Truck Division
WE	White Engines, Inc.

TABLE 3. PROPOSED SUBCODE FOR TYPE OF ENGINE

CODE	ENGINE
A	Spark Ignition Carbureted Engine
B	Spark Ignition Fuel Injected Engine
C	Spark Ignition Turbo-Charged Engine
D	Compression Ignition Natural Aspirated Engine
E	Compression Ignition Turbo-Charged Engine
F	Compression Ignition Turbo-Charged and Aftercooled or Intercooled
Z	Other



TABLE 4. PROPOSED SUBCODES FOR CONTROL SYSTEM

Code	Control System
A	Engine Modification
B	Air Injection
C	Exhaust Gas Recirculation
D	Oxidation Catalyst
E	Reduction Catalyst
F	Three-Way Catalyst
G	Air Injection + Exhaust Gas Recirculation
H	Air Injection + Oxidation Catalyst
J	Air Injection + Reduction Catalyst
K	Air Injection + Three-Way Catalyst
L	Exhaust Gas Recirculation + Oxidation Catalyst
M	Exhaust Gas Recirculation + Reduction Catalyst
N	Exhaust Gas Recirculation + Three-Way Catalyst
P	Smoke-Puff-Limiter
Q	One Bank Valve
R	Air Injection + Exhaust Gas Recirculation + Oxidation
S	Air Injection + Exhaust Gas Recirculation + Reduction Catalyst

T	Air Injection + Exhaust Gas Recirculation + Three-Way Catalyst
Z	Other

STANDARDIZED HDV ENGINE FAMILY NAMES

A	H	C	O	4	6	6	E
P	A	5					
Model	Manufacturer			Displacement			Type
Type	Unique-	Check					
Year					of		of
ness	Sum						
					Engine		Control
Digit	Digit						

### Check-Sum Digit (CSD)

A check-sum digit is used in codes as a means of checking that the characters entered are correct. For example, in university courses, the registration code for Math 321 Section 4 might be 456-321-4-5 (Math). The 5 is tacked on the end so that the sum of all the digits is evenly divisible by some arbitrary number, in this case 10 (i.e.,  $4 + 5 + 6 + 3 + 2 + 1 + 4 + 5 = 30$ , which is divisible by 10). Thus a transcription error such as 466-321-4-5 would be flagged by a computer program. If the codes are alpha-numeric, then a computer program will also have to convert the alphabetical characters to numerical values.

Error checking with a CSD can be made more effective if different weights are applied to the characters. For example, Character 1 might be multiplied by 9, character 2 by 8, and so forth. The CSD would be determined by adding the products and then dividing by some arbitrary number. This method would help catch transposition errors that would not be detected by the straight sum method. In the example shown, if the number were entered as 456-312-4-5 (the 1 and 2 being switched), and the digits were added separately, the computer would accept it since the sum is still equal to 30. However, if the characters were weighted, the sums would be different if two characters were switched.

### Method of Determining CSD

Step 1. Assign to each number in the ef code its actual mathematical value and assign to each letter the value specified below:

A = 1	J = 1	T = 3
B = 2	K = 2	U = 4
C = 3	L = 3	V = 5
D = 4	M = 4	W = 6
E = 5	N = 5	X = 7
F = 6	P = 7	Y = 8
G = 7	R = 9	Z = 9
H = 8	S = 2	decimal pt = 1

Chapter 2  
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Step 2. Multiply the assigned value for each character in the ef code by the weight factor specified for it below:

Weight Factor	
1st	10
2nd	9
3rd	8
4th	7
5th	6
6th	5
7th	4
8th	3
9th	2
10th	1

Step 3. Add the resulting products and divide the total by 11. The remainder is the CSD. If the remainder is 10, the CSD is X.

Example 1: HDV -Determine the CSD if the first 10 characters are AHC0466EPA.

	A	H	C	0	4	6	6	E	P	A
Assigned Value	1	8	3	0	4	6	6	5	7	1
Weighted Value	10	9	8	7	6	5	4	3	2	1
Products	10	72	24	0	24	30	24	15	14	1

Sum of Products = 214  
Divide by 11 = 18 + 5/11  
CSD = 5

Therefore, ef code is AHC0466EPA5

ENGINE DATA SHEET  
(Gasoline-Fueled Engines)

Engine Description

Engine Family

Displacement

Number of Cylinders

Engine Code

Emission Control System

Crankcase Emission Control System

Engine I.D. Number

Engine Model

Carburetor: Mfr.

Type

Part No.

Serial No.

Flow Curve No.

Distributor: Mfr.

Type

Part No.

Serial No.

Advance Curve No.

(Other component part numbers, serial numbers and flow curves or other performance check data.)

Governor Mfg.

Type

Maximum Governed Speed

RPM

Engine Horsepower (SAE) @

PRM

Engine Tuneup Data (Include all label specifications.  
Show specified and actual values as

Basic Ignition Timing / degrees IDC @ / RPM

Transmission in (gear if specified)

Idle Speed / RPM

Transmission in (gear)

Distributor point dwell angle / degrees

Spark plug gap / inches

Spark plug number

Automatic choke setting

Idle mixture setting procedure (if specified)

Recommended idle CO

Nominal thermostat temperature rating / F

Cooling system pressure / psig

Max. observed torque @ 2000 RPM

ENGINE DATA SHEET  
(Diesel Engines)

Engine Description

Engine Family

Displacement

Number of Cylinders

Engine Code

Emission Control System

Engine I.D. Number

Engine Model

Aspiration Device: Mfr.

Type

Part No.

Serial No.

Performance Curve

Fuel Injection Sys: Mfr.

Type

Part No.

Serial No.

Flow Curve No.

Governor: Mfr.

Serial No.

Type

Part No.

Serial No.

Performance Curve No.

(Other component part numbers, serial numbers, and flow curves or other performance data)

Rated Horsepower @  
RPM

Maximum torque lb-ft @  
RPM

Engine Tune-up Data (Include all label specifications.  
Show specified and actual values as

Injection Tim mg / degrees \_ TDC @ /  
RPM

Power Output

Fuel Rate at Rated HP / mm<sup>3</sup>/Stroke / lb/hr



Fuel Rate @ Max Torque                    /                    mm3/Stroke                    /                    lb/hr

Idle Speed /                    RPM

Governed speed: Max No Load                    /                    RPM

                  Max Loaded                    /                    RPM

Value Lash

Air Box Pressure

# SECTION 12--Emission Test Results

## Test Log1 (Gasoline-Fueled Engine)

Engine Family	Model	Code					
Displacement							
Emission Control System		Engine I.D. Number					
Tested under transient operating conditions /			(f)(1)	/	(f)(3)		
Total Services2							
Exhaust Emissions	Test	Test	Total	Accumulation	Event		
Grams/BHP-hour				Percent			
Date	No.	Hours	Hours	Description	HC	CO	NOx
		Idle CO					

1. Indicate all emission measurements performed on a engine, including EPA tests. Also indicate whether tests are performed before or after tuneup, scheduled maintenance, unscheduled maintenance, giving brief description of the maintenance and additional information requested by EPA (engineering reports, data, etc.). Include partial, void, and other tests.

2. Include only operating time that meets the requirements of 40 CFR

86.084-24(c).

# SECTION 12--Emission Test Results

Test Log1  
(Diesel Engines)

Engine Family		Model		Code	
Displacement					
Emission Control System				Engine I.D. Number	
CO waiver (yes or no)					
Emissions	Exhaust Emissions	Total Services		Smoke	
Test Test	Total	Test Type			
(Percent)	Grams/BHP-Hour	Accumulation2	Event		
Date No.	Hours	Cold or Hot	Description	Accel.	
L.D. Peak	HC CO NOx	Hours			
		Start			

1. Indicate all emission measurements performed on a engine, including EPA tests. Also indicate whether tests are performed before or after tuneup, scheduled maintenance, unscheduled maintenance, giving brief description of the maintenance and additional information requested by EPA (engineering reports, data, etc.). Include partial, void, and other tests.

2. Include only operating time that meets the requirements of 40 CFR

86.084-24(c).

## ENGINE MAINTENANCE LOG1

Engine Family

Model

Code

Displacement

Emission Control System

Engine I.D. Number

Date	Total Service Accumulation Hours	Total Engine Hours	Maintenance	Engineering Report No.
------	-------------------------------------	-----------------------	-------------	---------------------------

1. List all schedule and unscheduled maintenance. All specifications checked should be reported, e.g., RPM before and after reset, ignition timing. New

I.D. number should be reported for replaced components. Any addition of engine oil between regular oil change points should be reported.

HEAVY-DUTY GAS AND DIESEL ENGINE CERTIFICATION INFORMATION SHEET  
Subpart I, N, and P Test Procedures

FAMILY INFORMATION

CORPORATE NAME (MFR): . . . . . /  
ENGINE FAMILY NAME: . . . . . / \_ / \_ \_ / \_ / \_ / \_ \_ / \_ / \_ \_ /  
MODEL YEAR: . . . . . / \_ / \_  
NUMBER OF CYLINDER: . . . . . / \_ / \_ /  
METHOD OF ASPIRATION: (T,N)\* . . / /  
FUEL SYSTEM (CB, FI):\* . . . . . / / /  
FAMILY SALES: . . . . . / \_ \_ \_ /  
TRANSIENT OPERATING CONDITION (gas only)\* \_  
INTENDED SERVICE CLASS (diesel only)\* \_ / Useful Life Mileage / \_  
\_ \_ \_ \_ \_ \*\*\*\*  
CO WAIVER YES-NO (diesel only)/  
  
FAMILY MODELS:\*\* . . . . . . [ ]

FAMILY DISPLACEMENTS (CI or Liters):\*\* [ ]

TEST ENGINE INFORMATION

MODEL . . . . . /  
DISPLACEMENT (CI or  
liters). . . . .  
EMISS CNTRL SYS\* . . . . . / \_ \_ / \_ - / \_ \_ / \_ - / \_ \_ \_ / \_ \_ \_ - / \_  
\_ \_ - /  
ENG CODE. . . . . /  
NUMBER OF CARBS -  
VENTURIES (gas only). . . / \_ - / \_ V / / \_ \_ \_ V  
/  
RATED HP @ ENG SPEED. . . / \_ / \_ @ / \_ / \_ / \_ / / / \_ \_ \_ @ /  
\_ /  
RATED TORQUE @ ENG SPEED. / / =  
ENGINE ID NUMBER. . . . . r

OFFICIAL TEST RESULTS: (Exhaust Emissions)



TEST NUMBER: . . . . .

TEST TYPE (diesel only)\*

HC (gm/bhp-hr) . . . / \_ \_ \_ / \_

/ \_ / . \_ /

CO (gm/bhp-hr) . . . / \_ / \_ \_ / \_

/ \_ \_ ,

NOx (gm/bhp-hr) . . . / \_ / \_ / , \_ \_

/ \_ \_ / . \_

/

Idle CO (Percent)\*\*\* / \_ / \_ / \_ /

/ \_ /

DETERIORATION FACTORS: (Exhaust Emissions)

HC (DF) . . . . . / \_ \_ / . \_ / \_ /

/ \_ \_ / . \_

/

CO (DF) . . . . . / \_ / / \_ / /

/ \_ / \_ .

NOx (DF) . . . . . / \_ / \_ \_ \_

/ \_ /

Idle CO (DF)\*\*\* . . . / \_ / \_ / . \_ / \_

/

DF Type (A,M)\* . . . / \_

/

CERTIFICATION LEVELS: (Exhaust Emissions)

HC (gm/bhp-hr) . . . . / \_ . \_ \_ /

/

CO (gm/bhp-hr) . . . . / \_ / \_ \_

/

NOx (gm/bhp-hr) . . . / \_ \_ /

Idle CO (Percent)\*\*\* / \_ . \_ / \_

/

Section 16

CORPORATE NAME (MFR): . . . . . /  
ENGINE FAMILY NAME: . . . . . / \_ / \_ / \_ / \_ / \_ / \_ / \_ \_ \_ /  
MODEL YEAR: . . . . . / \_ /

TEST ENGINE INFORMATION

OFFICIAL TEST RESULTS: (Smoke Emissions)

TEST NUMBER: . . . . . /  
ACCELERATION (%). . . / \_ / \_ \_ \_ / \_ /  
LUG (%). . . . . / \_ \_ / \_ \_  
/ PEAK (%). . . . . / \_ / \_ / . \_ \_  
/ \_ \_ .

DETERIORATION FACTORS: (Smoke Emissions)

ACCELERATION (DF). . . / \_ \_ / . \_ / \_  
LUG (DF). . . . . / \_ / \_ / . \_ \_  
PEAK (DF). . . . . / \_ / \_ / . \_ \_  
/ \_ \_ j,

Certification LEVELS: (Smoke Emissions)

ACCELERATION (%). . . / \_ \_ \_ /  
LUG (%). . . . . / \_ / \_ / . \_ /  
PEAK (%). . . . . / \_ / \_ . \_ /  
/ \_ \_ / . \_ /

COMMENTS:

(\*) Codes: Aspiration:

DF Type

Fuel System:

N -Natural	A-Additive	CB
-Carburetor		
T -Turbocharged	M-Multiplicative	FI
-Fuel Injection		

Emission Control System:

Transient

Operating Condition

EM -Engine Modification

F1 -40 CFR Part 86

Appendix I (f)(1)

AIR -Air Injection  
Appendix I (f)(3)  
EGR -Exhaust Gas Recirculation  
CAT -Catalyst  
Service Class  
SPL -Smoke-Puff-Limiter (Diesel Only)  
Light  
OBV -One Bank Value  
Medium  
  
Heavy

F3 -40 CFR PART 86

Intended

(\*\*) Separate each model or displacement with a semicolon (;)  
Test Type  
(\*\*\*) Applies to gasoline-fueled engines only.  
Cold Start  
(\*\*\*\*) If different than EPA defined mileage.  
Hot Start

## Section 16 -PRODUCTION ENGINE PARAMETERS

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Engine	Part Numbers	Engine Code	Engine Code
Fuel pump part number			
Carburetor assembly part number			
Fuel injection control unit/injection pump part number			
Spark plug/fuel injector identification number			
Alternate spark plug and heat range			
Distributor assembly part number			
Turbocharger part number			
Supercharger part number			
Smoke Puff Limiter part number			
Crankcase emission control system--component part number			
Evaporative emission canister part number (if applicable)			
Auxiliary emission control devices - identification (color, production code, number, etc.) of calibrated components			
Air injection system:			
Air pump part number			
Diverter valve part number			
Check valve part number			
Pressure relief valve part number			
Exhaust gas recirculation system:			
EGR valve			

Amplifier

Modulator

Delay valve

Catalyst assembly part number

Other major exhaust emission control  
system--part number(s) of calibrated  
component(s)

Emission control related warning system--  
part number(s) of calibrated component(s)